INSTRUCTION BOOK

and

OPERATING MANUAL

Amateur Receiver

MODEL PMR-8

MULTI-ELMAC®

MULTI-PRODUCTS COMPANY
OAK PARK 37, MICHIGAN

www.everything4lessstore.com

MULTI-PRODUCTS COMPANY

MULTI-ELMAC

RADIO COMMUNICATIONS

AND CONTROL EQUIPMENT

PMR-8 SPECIFICATIONS

SENSITIVITY:

.5 microvolt or better on the high-frequency bands and 2 microvolts or better on the broadcast band for a 10 DB signal to noise ratio.

SELECTIVITY:

6 DB down at ± 3 Kc.
60 DB down at ± 15 Kc.

AUDIO OUTPUT:

Less than 10% distortion at 1 watt output.

NOISE LIMITER:

Automatic series gate type.

21470 COOLIDGE HIGHWAY **OAK PARK 37, MICH.**

FORM NO. DM-155

TABLE OF CONTENTS

SECTION I

DESCRIPTION

1.1 GENERAL. The BELTE-KLEMM PMR-9 RADIO RECEIVER is a nine tube double conversion superheterodyne covering the 80, 40, 20, 15, 10, and 6 meter amateur bands, plus the standard broadcast band. Designed primarily as an efficient communications receiver for mobile use, it is also especially suitable, because of its small size, for (1) marine and aircraft installations; (2) portable operation; and (3) as a fixed station or monitoring receiver. It is not intended as a converter or accessory to another unit, but a complete receiver, employing a separate power supply and speaker as described in this manual. Every effort has been made to furnish the user with an extremely stable receiver of rugged construction, compact layout, and high sensitivity.

1.2 DIMENSIONS. The maximum external dimensions of the PMR-9 receiver, including the control knobs are: height, 6 5/8", width, 7", and depth, 12". The depth behind the panel is 9 7/8". The net weight of the receiver is 8 1/2 pounds.

1.3 CIRCUIT DESCRIPTION. The circuit consists of one stage of radio-frequency amplification, a first mixer and oscillator section. Tuning, with accurate tracking, is accomplished with a three-gang condenser. The output frequency of the first mixer is 2210 kc. and is inductively coupled to the second mixer and crystal controlled oscillator contained in one tube. The output frequency of the second mixer is 262 kc. and is coupled through two tuned circuits to one stage of I.F. amplification. A triode purpose tube is used as the detector, delayed A.V.C. and A.N.L. The first audio amplifier and beat-frequency oscillator are combined in a dual purpose tube. The first audio is followed by a power amplifier supplying sufficient output for speaker and headphone operation. A block diagram is shown in figure 1.

In the design of the PMR-9, an outstanding signal to noise ratio has been accomplished and is apparent by the pronounced lack of background noise when operated with the gain controls advanced to maximum and the antenna disconnected.

High sensitivity and a good noise figure has been obtained by the use of a high gain R.F. amplifier and shielded R.F. coil design. The good noise figure is obtainable by designing the front end coils for optimum Q and minimum cable transfer. Since the primary noise characteristics of a receiver are determined in the R.F. coils, care in their design has resulted in an excellent signal to noise ratio and noise figure. A secondary consideration in determining the noise figure of a receiver is the selection of the first I.F. frequency. The noise passed by an I.F. amplifier is proportional to the bandpass of the amplifier. 262 kc. was chosen for good selectivity characteristics and percent noise reduction.

The overall drift in the receiver has been kept to a minimum by the use of temperature compensating capacitors in the local oscillator, voltage regulated plate and filament supply and a crystal controlled second conversion oscillator. Rigid mechanical construction also adds to the general stability of the unit.

Delayed A.V.C. is used in the receiver to provide maximum sensitivity with the use of A.V.C., as ordinary Automatic Volume Control circuits, inherent noise in the receiver will produce some bias voltage. This bias voltage when applied to the amplifiers will reduce the sensitivity of a receiver. A system employing delayed A.V.C. prevents this bias from being applied to the amplifiers until the input signal is in excess of 8 volts at the A.V.C. rectifier diode.

The R.F.O. in the receiver injects energy into the 262 kc. I.F. amplifier. Minimum coupling is used between the beat-oscillator and I.F. amplifier for maximum isolation between the two stages. The R.F.O. control is marked OFF, upper skirt-knob, and ON, lower skirt-knob, indicating which side the beat oscillator is placed on the I.F. band-pass. A frequency deviation of plus 2 kc. to minus 2 kc. is obtainable by rotation of the control. Optimum CW and SSB reception is obtainable with the control positioned approximately half-way between zero and plus or zero and minus depending on the sideband desired. Slow rotation of the R.F.O. control will give a variable effect in tuning in CW and SSB stations.

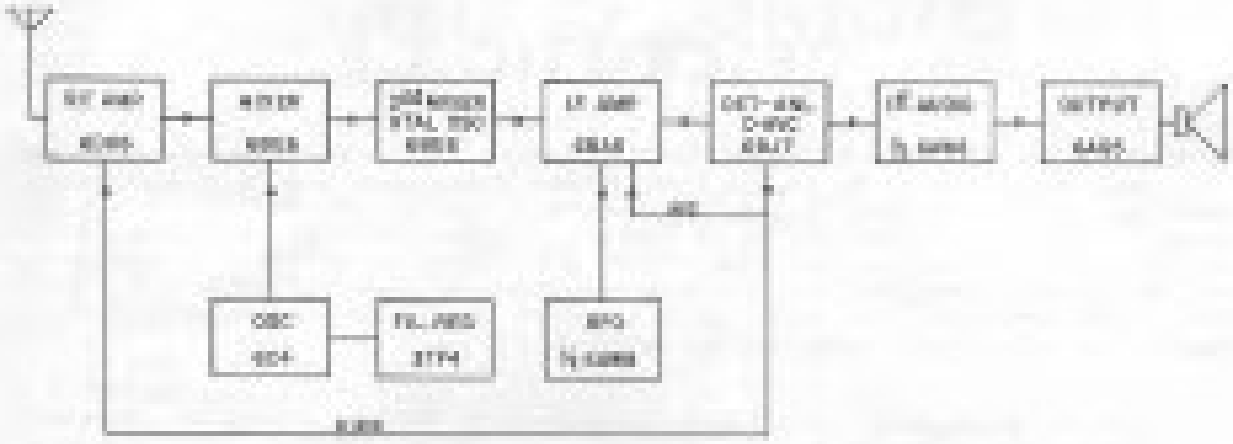


FIGURE 1 RME-6 BLOCK DIAGRAM

1.4 TUBE COMPLEMENT. The RME-6 is supplied complete with all tubes listed in the receiver at the time of shipment. The tube types are as follows:

R.F. Amplifier	6DS8
First Mixer	6BE8
H.F. Oscillator	6C4
Second Mixer and Crystal Oscillator	6BE8
Second I.F. Amplifier	6BA8
Det., A.V.C., A.N.L.	6BD7
First Audio and B.F.O.	6AV8
Audio Output	6AQ8
Filament Regulator	6BY4

1.5 TUNING SYSTEM. A three-gang tuning capacitor and 21 slug-tuned coils are used to cover the 7 segments which are selected by a panel switch, as follows:

6 METER BAND	50.0 to 54.0 Mc
10 METER BAND	28.0 to 29.7 Mc
15 METER BAND	21.0 to 21.45 Mc
20 METER BAND	14.0 to 14.35 Mc
40 METER BAND	7.0 to 7.3 Mc
80 METER BAND	3.5 to 4.0 Mc
BROADCAST BAND	54 to 1.6 Mc

1.6 ANTENNA INPUT. The receiver is designed for use with a noninductive antenna coupled to the receiver input with a transmission line of 50 to 72 ohms impedance. Detailed installation recommendations are contained in paragraph 2.3.

1.7 AUDIO OUTPUT. An output transformer matching the output tube to a permanent magnet dynamic speaker having a voice coil impedance of 3.2 ohms is included in the receiver chassis. The speaker leads terminate at the power plug on the receiver chassis. Also included on the rear of the receiver chassis is a headphone jack that disables the speaker when the headphones are in use.

1.8 POWER SUPPLY AND ACCESSORY. The following power supply is available for use with the MILLEN ELMAC FMR-9 receiver.

3107 A universal 6 or 12 volt 24 and 120 volt AC power supply. (provides filament voltage, one low voltage regulated source and two separate high voltages.)

3117 Same as 3107 but only in 6/12 volts.

None Due to different requirements, for individual installations, no suitable for the 3107 (3117) power supply is available from the factory.

889-3 The 889-3 is a 2 inch "S" meter mounted in a metal box suitable for mobile or fixed operation. It is supplied with a cable and may be installed in the receiver power supply as indicated in figure 8.

AS-1 A 4 inch speaker mounted in a metal enclosure with universal mounting bracket and connecting cable.

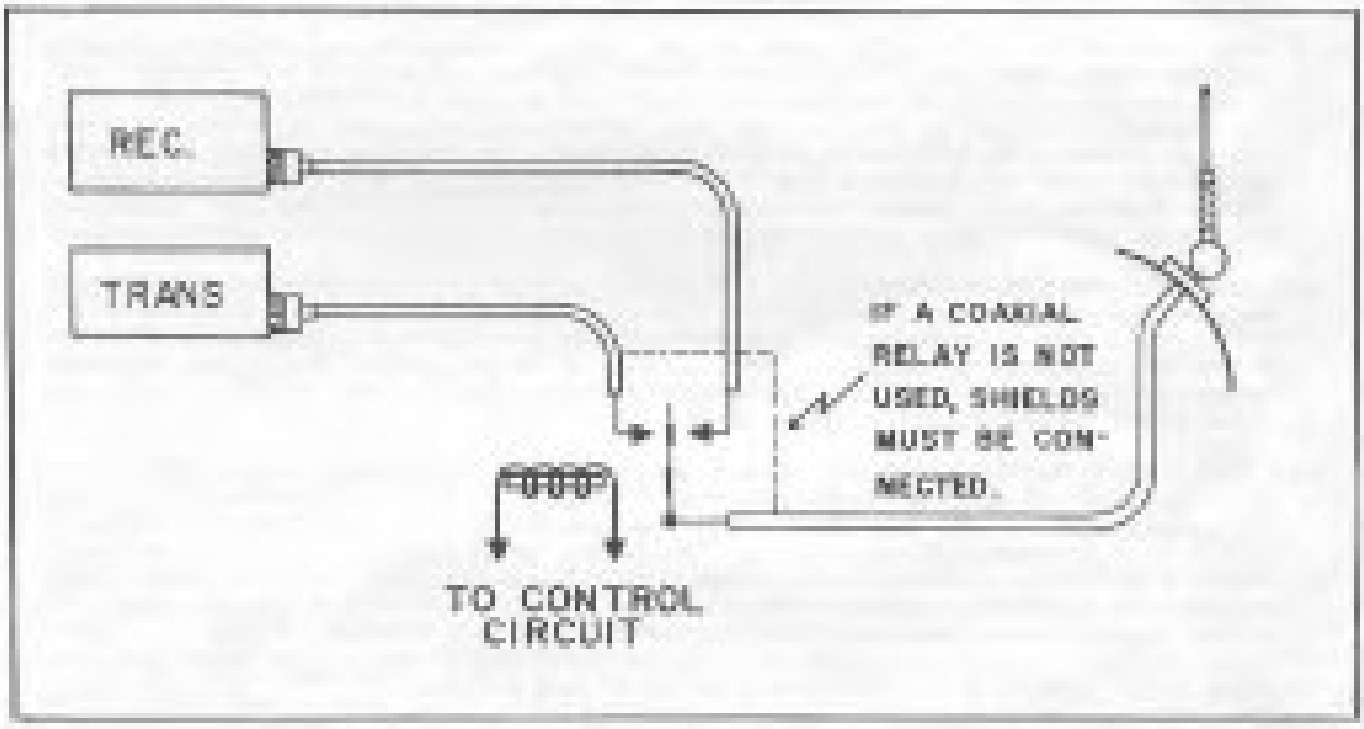
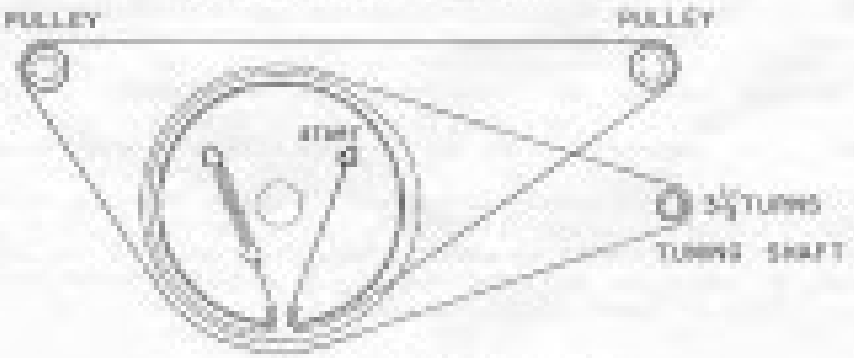


FIGURE 2 ANTENNA CONTROL CIRCUIT



DIAL STRINGING OF FMR-9

SECTION 2

INSTALLATION AND OPERATION

2.1 GENERAL CONSIDERATIONS. No two installations being alike, the ease with which MULTI-ELMAC FMR-6 receiver will vary to satisfaction according to the space available, and the individual operator's desires in regard to operating practices. Regardless of these variations, wherever the receiver is installed in a vehicle, there are three essentials to a proper installation: (1) Convenient location for operation, including ease of observation; (2) Rigid mechanical mounting; and (3) elimination of radio noise. The amateur experienced in mobile radio work will have his own preferences. It is suggested that before installation is begun, the owner read the very thorough treatment given to mobile installations in the past issues of QST and CQ magazines.

2.2 MOUNTING METHODS. The light weight of the FMR-6 makes it readily adaptable to a hanging mount from the lower edge of the dashboard. A length of aluminum angle stock from the rear corner of the receiver cabinet to the fire wall of the vehicle will complete a simple but rigid mount. If the individual wishes to spend the extra time and money and the car dashboard has sufficient space, a very neat installation can be effected by making the proper cut-out into the instrument panel and mounting the receiver flush. This method is suitable where the panel contains a removable metal grille which can be replaced if the receiver is removed. Most amateurs have sufficient hardware to fashion a bracket that would serve their particular needs better than any universal bracket that could be supplied.

2.3 ANTENNA. The MULTI-ELMAC FMR-6 receiver will perform most efficiently when it is coupled to an antenna resonant on the frequency band to which the receiver is tuned. As in the operation of a fixed amateur station, this condition is most easily obtained by using the same antenna for both transmitting and receiving. A change-over relay operated by the push-to-talk switch on the microphone is required, and may be installed between the receiver and transmitter with a common coaxial line to the antenna. See Figure 2 for a typical circuit.

2.4 POWER SUPPLY. The MULTI-ELMAC FMR-6 receiver requires a filament voltage of 6.3 or 12.6 volts at 3.8 or 1.9 amperes respectively, and a "B" supply voltage of 180 volts at 70 Ma. and 105 volts regulated at 10 Ma. This latter voltage may be derived from the 180 volt supply. The power supply may be located anywhere in the vehicle providing the hot lead (either 6 or 12 volts) is heavy enough to furnish the necessary current without undue voltage drop. Make sure that the case of the power supply is efficiently grounded to the car body. If this cannot be done with the mounting bolts, a heavy copper braid ground strap must be provided. This insures sufficient voltage to the power supply and also eliminates the possibility of the receiver picking up vibrator hash noise. The power supply can be bolted to the fire wall either in the car or under the hood.

> Note: All FMR-6 receivers are shipped from the factory wired for 12 volt filament operation. A type 3TF1 tube is used to regulate the filament voltage of the 6C4, first oscillator, on 12 volt operation only. If 6 volt operation is contemplated, it will be necessary to connect a wire between pin 4 and 8 of the 3TF1 socket and rewire terminals 1, 2, and 3 of the power plug cable connector as outlined in figure 5.

2.5 "S" METER. Provision has been made for the attachment of an external "S" meter (0-50 microampere relative signal strength) readings. This meter is available in the form of a kit that can be mounted in any convenient place in the vehicle and connected to the power plug as indicated in figure 5.

2.6 CONTROL CIRCUITS. While this manual does not include notes on some general instructions on control systems for mobile installations, it is important for the user of the FMR-6 receiver to employ control circuits that will: (1) protect the receiver from R.F. overload by shorting it during periods of transmission, (2) make the transmitter inoperative when the send-receive switch is released, and (3) achieve a maximum economy of battery drain.

2.7 CONTROL FUNCTIONS.

A.F. GAIN — Rotate control clockwise to turn power on. Control adjusts audio level. Advance control to approximately two-thirds gain for SSB and CW reception.

R.F. GAIN — Rotate control clockwise to increase amplification of the R.F. stage. Advance R.F. gain control to maximum setting for full A.V.C. action. Use R.F. gain as volume control when receiving CW and SSB.

BAND — Rotate control to the desired band as indicated on the panel. Set the corresponding scale on the tuning dial.

ANT — Rotate antenna control to either direction for maximum signal (pick-up) or background noise.

SSB-CW AM — Switch to upper position turns on the beat-frequency oscillator for the reception of CW and SSB signals.

ANL — Switch in upper position turns on the Automatic Noise Limiter.

BFO — Adjusts frequency of the beat oscillator. Rotation of the control allows reception of upper or lower side-band as indicated on the panel.

TUNING — Rotate control in either direction to tune-in desired signal. Frequency is indicated directly in megacycles on the dial scale.

2.8 VEHICULAR NOISE SUPPRESSION: The proper utilization in a mobile installation of a good communications receiver such as the MULTI-ELMAC FMR-5 is possible only when vehicular noise has been effectively eliminated or suppressed. Many radio noises present in a vehicle can be eliminated at their source. Most other noises of local origin can be suppressed, using techniques and devices to control them. However, after efficient noise suppression has been completed, it will be found that the automatic noise limiter built into the MULTI-ELMAC FMR-5 receiver will reduce all but the worst noise pulses to a level which will not interfere with satisfactory radio communication. It is particularly recommended that the following noise suppression be accomplished.

(1) The installation of spark plugs containing built-in 10/00 ohm suppressors or 10,000 ohm suppressors mounted on each plug.

(2) The installation of a .1 mfd coaxial capacitor in series with the battery lead to the ignition coil. This should be mounted as close as possible to the coil input terminal, and a good ground made to the capacitor case.

(3) The installation of a .1 mfd coaxial capacitor in the "hot" lead coming out of the vehicle-generator armature, replacing the normal automotive unit. The capacitor should be carefully grounded to the generator frame. All points and unit should be covered with sealing gum.

(4) The installation of a .1 mfd coaxial capacitor between the battery terminal of the voltage regulator and ground, with the capacitor case well grounded as before. The installation of a .002 mfd mica capacitor in series with a four (4) ohm carbon resistor from the field terminal of the voltage regulator to ground.

(5) Residual noise remaining after the above precautions have been taken can be located by the process of elimination. In certain makes of automobiles, the various panel instruments radiate interference at radio frequencies which can be eliminated with appropriate by-pass capacitors from the "hot" side of the offending instrument to ground.

SECTION 3

SERVICE AND ALIGNMENT

3.1 GENERAL. Satisfactory operation of the receiver depends on several general factors. Before removing a receiver which is performing in an unsatisfactory manner, carefully inspect external connections, power cables and plugs, the storage battery and connections of a vehicular installation, and the A.C. power source if operated in a fixed location, and the speaker connections. It is an aggravating waste of time and effort to remove and attempt to service a receiver when the trouble is an external one.

(a) ANTENNA. If the receiver has its normal noise level, but signals are very weak, look for a broken antenna lead close to the receiver, or for an open or inoperative antenna relay.

(b) CABLES AND PLUGS. The hybrid installation should locate all cables and plugs where they will not be exposed to physical shock or subjected to twisting and bending.

(c) FUSES. Check fuses with an ohmmeter. A good fuse has no appreciable resistance.

3.2 TUBES. Even though modern methods of production are producing more reliable tubes than ever, the first source of trouble is most likely to be a defective tube. Tube failure will produce weak signals, intermittent operation, noise, or a completely dead receiver. When checking tubes, mark them as they are removed from the receiver so that they may be returned to their original sockets. Whenever a tube is changed in any circuit, that circuit should be re-aligned for peak performance as outlined in the section on alignment.

Any tube should be tapped while operating to check for microphonics, which will make operation of a mobile receiver

3.3 CIRCUIT FAILURE. Defective tubes, the most common source of circuit failure will normally be found in the defective of resistors and capacitors within the receiver. A defective resistor or capacitor can usually be found by a point-to-point continuity test, although a careful visual inspection will often show the defective part, such as charred resistors. Figure 6 is an operating voltage and resistance chart and permits a careful check of operating elements. The check should be made with a D.C. voltmeter of 20,000 ohms per volt sensitivity or a vacuum tube voltmeter. All measurements are made with an MARS power supply. (Any supply may be used that will give the same "B+" voltage.)

3.4 GENERAL ALIGNMENT INSTRUCTIONS. Thoroughly familiarize yourself with the layout of all of the coils as shown in Figures 3 and 4 before beginning alignment. All adjustments are made including the R.F. and I.F. coils with one exception. The broadcast oscillator coil is located under the chassis near the front of the receiver as can be seen in Figure 3 and 4.

Check the dial cord and the pointer to be certain that there is sufficient tension on the cord, and that the pointer slides free of all obstructions. Before alignment, be sure you have an accurate signal generator. If at all possible, re-check that all of the alignment frequencies specified are performed for maximum accuracy. The alignment of the receiver can never be more accurate than the signal generator with which it was aligned.

3.5 I.F. AND B.F.O. ALIGNMENT. Remove the 6C4 oscillator tube.

Set the R.F. gain control to its full clockwise position.

Set the B.F.O. Switch to the AM position. Connect the signal generator through a .001 mfd. mica capacitor to the control section of the tuning capacitor.

Ground: A vacuum tube voltmeter from the A.V.C. bus to ground. If a vacuum tube voltmeter is not available, connect a 0 to 10 milliampere meter in series with the lead coming from pin 6 on the receiver power plug.

With the signal generator set at 1215 kc. adjust all of the I.F. slugs for maximum response. It should be noted that maximum response is a relative reading on the 0 to 10 milliampere meter. There are two slugs in T2, T3, T4, and T5 adjustable from the top or bottom of the chassis. A special 3/32" hex screwdriver (General #6808) is necessary for the adjustment of all coils. When adjusting the I.F. coils for maximum response, care should be exercised to keep the output from the signal generator low enough to prevent overload of the receiver. When the I.F. stages have

best signal, set the B.F.O. switch to CW, BFO position and set the B.F.O. control to zero-beating. Adjust the B.F.O. coil, T8, for zero beat. It will be noted that it is not necessary to adjust the 455 kc. amplifier with 455 kc output from the signal generator. This is true because the crystal oscillator (2908 kc.) derives 455 kc. automatically from the 2218 kc. signal. (2908-2218 equals 455)

Replace the dial plate.

2.6 R. F. ALIGNMENT. Before the R.F. alignment or logging the pointer must be positioned properly in relation to the dial. When the tuning capacitor is completely meshed (plates) the pointer should be aligned with the edge of the black border at the left side of the dial face. If this is not done the pointer may not track properly across the entire tuning range.

Any signal generator used to align this receiver must have a good attenuator. The output from the signal generator should be kept low enough to prevent the A.V.C. from operating.

The Bands may be aligned in any order, but for the sake of this manual, we will start with and align the bands in order.

6 METER BAND (49.8 to 51.0 Mc.)

Set the Antenna trimmer to the middle of the range.

Set the Bandswitch on the 6 METER BAND.

Set the receiver Dial to 50.8 Mc.

Connect a signal generator to the receiver antenna jack and set the generator to 50.8 Mc.

Adjust the 6 Meter oscillator coil until the signal is tuned in properly.

Adjust the 6 Meter Antenna coil and Converter coil for maximum output. Check the tracking at 50.0 Mc. and 51.0 Mc. If tracking is satisfactory, all at three test points the setting of the trimmer C23-B will have to be changed at the high end and the oscillator coil readjusted at the low end of the band. Several trials between these two settings will be all adjustment may be necessary to achieve proper tracking. NOTE: The oscillator is on the low side of the signal.

10 METER BAND (28.8 to 29.7 Mc.)

Set the Antenna trimmer to the middle of its range.

Set the Bandswitch to the 10 METER BAND.

Set the receiver Dial to 29.0 Mc.

Connect a signal generator to the receiver antenna jack and set the generator to 29.0 Mc.

Adjust the 10 Meter oscillator coil until the signal is tuned in properly.

Adjust the 10 Meter Antenna coil and Converter coil for maximum output.

Check the tracking at 28.8 and 18.7 Mc. If the tracking is off proceed as for 6 meters above using C19-B and the 10 meter oscillator adjusting slug. NOTE: The oscillator is on the low side of the signal.

15 METER BAND (21.0 to 21.45 Mc)

Set the Antenna trimmer to the middle of its range.

Set the Bandswitch on the 15 METER BAND.

Set the receiver Dial and the signal generator to 21.0 Mc.

Adjust 15 Meter oscillator coil until the signal is tuned in properly.

Adjust the 15 Meter Antenna and Converter coils for maximum output.

Check the tracking at 21.0 and 21.45 Mc. Correct any error in tracking by using trimmer C19-F and the 15 meter oscillator coil adjustment slug. NOTE: The oscillator is on the low side of the signal.

20 METER BAND (14.0 to 14.4 Mc)

Set the Antenna trimmer to the middle of its range.

Set the Bandswitch on the 20 METER BAND.

Set the receiver Dial and the signal generator to 14.2 Mc.

Adjust the 20 Meter oscillator coil until the signal is tuned in properly.

Adjust the 20 Meter Antenna and Converter coils for maximum output.

Check the tracking at 14.0 and 14.4 Mc. Correct any error in tracking using trimmer C55-A and the 20 meter oscillator coil adjustment slug. NOTE: The oscillator is on the high side of the signal.

40 METER BAND (7.0 to 7.3 Mc.)

Set the Antenna trimmer to the middle of its range.

Set the Bandswitch to the 40 METER BAND.

Set the receiver Dial and the signal generator to 7.15 Mc.

Adjust the 40 Meter oscillator coil until the signal is tuned in properly.

Adjust the 40 Meter Antenna and Converter coils for maximum output.

Check the tracking at 7.0 and 7.3 Mc. Correct any error in tracking by using trimmer C55-C and the 40 meter oscillator coil adjustment slug. NOTE: The oscillator is on the high side of the signal.

80 METER BAND (3.5 to 4.0 Mc.)

Set the Antenna trimmer to where the plates are most open(or meshed). The antenna coil will not tune at any other setting.

Set the Bandswitch on the 80 METER BAND.

Set the receiver Dial and the signal generator to 3.75 Mc.

Adjust the 80 Meter oscillator coil until the signal is tuned in properly.

Adjust the 80 Meter Antenna and Converter coils for maximum output.

Check the tracking at 3.5 and 4.0 Mc. Correct any error in tracking by using trimmer C55-E and the 80 meter oscillator coil adjustment slug. NOTE: The oscillator is on the high side of the signal.

BROADCAST BAND (.55 to 1.6 Mc)

Set the Antenna trimmer to where the plates are fully meshed.

Set the Bandswitch on the BROADCAST BAND.

Set the receiver Dial and the signal generator to 600 kc.

Adjust the broadcast oscillator coil until the signal is tuned in properly.

Adjust the broadcast converter coil for maximum output.

Set the Antenna trimmer to where the plates are fully meshed.

Set the receiver Dial and signal generator to 1400 kc.

Adjust the broadcast Antenna and oscillator C30 for maximum output.

Check the tracking at 600 and 1400 kc. Correct any error in tracking by using trimmer C55-H and the broadcast oscillator coil slug. NOTE: The oscillator is on the high side of the signal on this band and the oscillator frequency is relatively high due to the high first intermediate frequency. The broadcast oscillator tunes from 2.175 to 3.025 Mc.

4.7 "S" METER ADJUSTMENT. Remove antenna and short input jack with a piece of bare wire. Adjust potentiometer R-1 until the "S" meter reads zero under this zero signal condition. The "S" meter should read zero when the receiver is turned off. It can adjust to zero with panel screw adjustment on the meter. If it becomes necessary to replace the second I.F. amplifier tube, a careful selection of tubes must be made since changes in the electrical characteristics of the tube will change the sensitivity of the "S" meter.

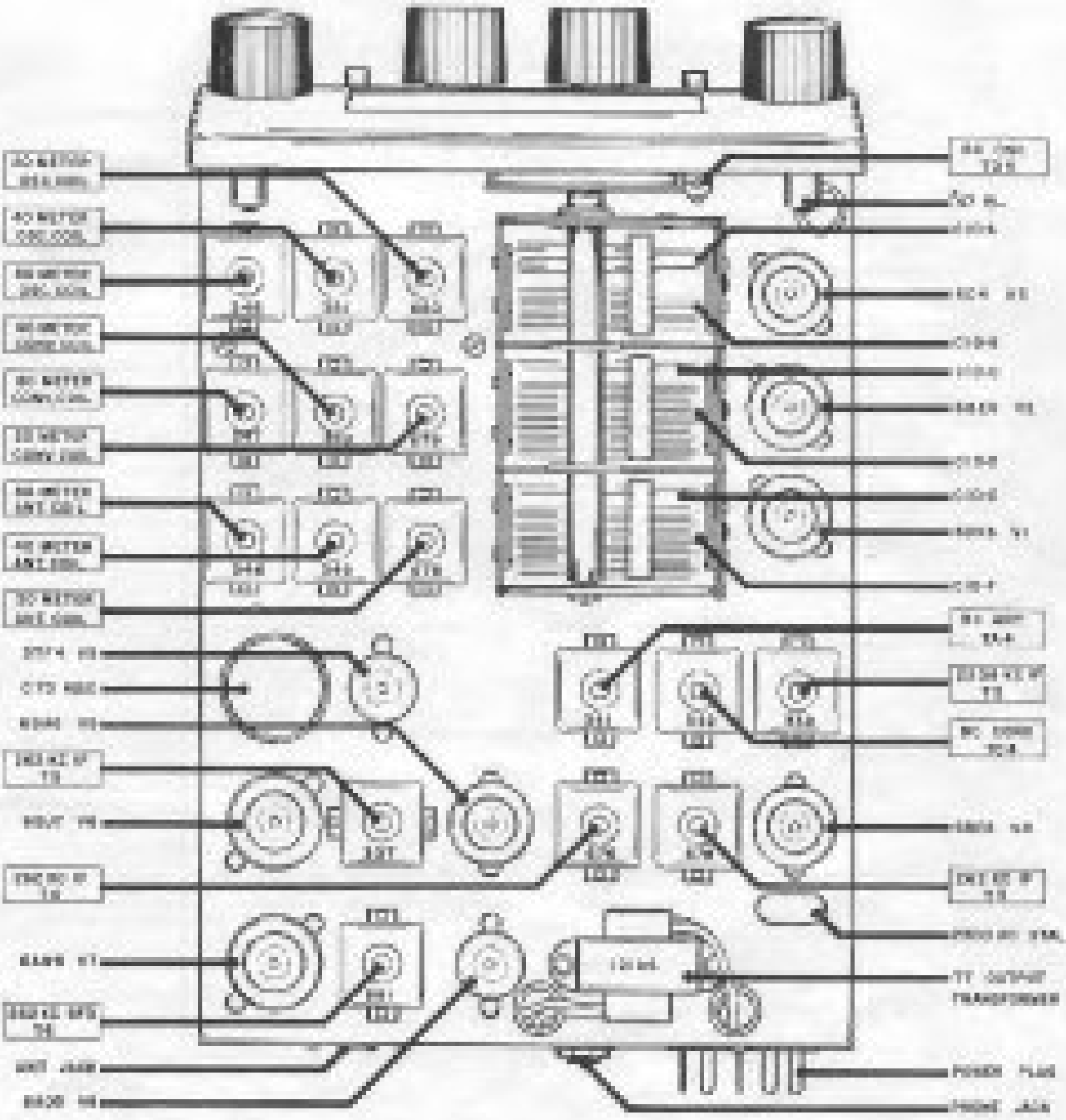
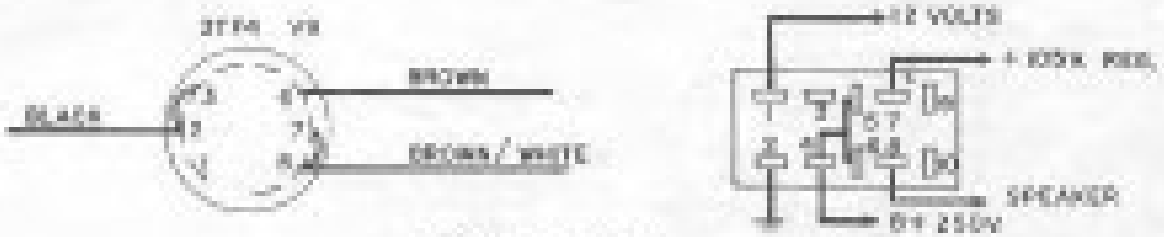
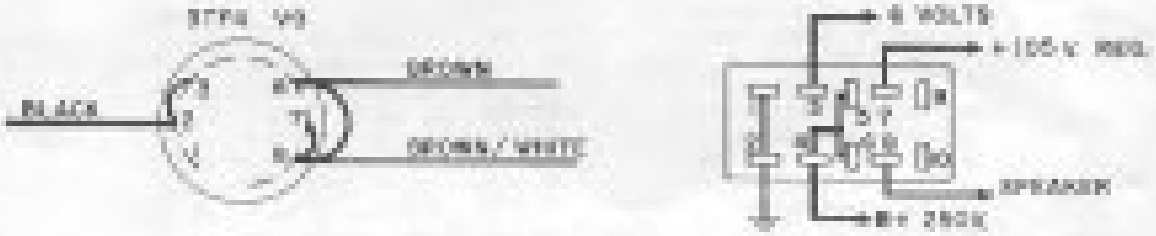


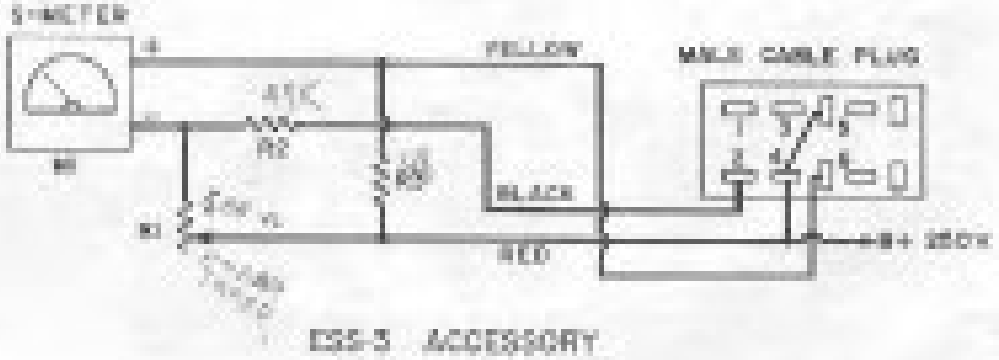
FIGURE 3 PWB-8 TOP VIEW



12 V. OPERATION



6 V. OPERATION



ESS-3 ACCESSORY

FIGURE 5 PM6-6 POWER CONNECTIONS

[illegible] PARTS LIST

SYMBOL	DESCRIPTION				PART NO.
C10A to F	Capacitor, tuning, variable				[illegible]
C11	Capacitor, variable, 75 mmf.				[illegible]
C12	Capacitor, fixed, disc ceramic	.002 mfd.			
C13	Capacitor, fixed, disc ceramic	.005 mfd.			
C14A to D	Capacitor, fixed, disc ceramic	.005 mfd. (ea)			
C15	Capacitor, fixed, disc ceramic	.005 mfd.			
C16	Capacitor, fixed, disc ceramic	.005 mfd.			
C20	Capacitor, variable, ceramic NPO 3 to 20 mmf.				
C21A to D	Capacitor, fixed, disc ceramic	.005 mfd. (ea)			
C22	Capacitor, fixed, silver mica	5 mmf.			
C30	Capacitor, fixed, silver mica	15 mmf.			
C31	Capacitor, fixed, disc ceramic	.01 mfd.			
C32	Capacitor, fixed, silver mica	100 mmf.			
C33A to D	Capacitor, variable, ceramic NPO [illegible] to [illegible] mmf.				
C40	Capacitor, fixed, disc ceramic	.002 mfd.			
C41	Capacitor, fixed, silver mica	25 mmf.			
C42	Capacitor, fixed, silver mica	100 mmf.			
C43	Capacitor, fixed, disc ceramic	.005 mfd.			
C44	Capacitor, fixed, disc ceramic	.005 mfd.			
C45	Capacitor, fixed, silver mica	5 mmf.			
C46	Capacitor, fixed, disc ceramic	.01 mfd.			
C47	Capacitor, fixed, disc ceramic	.01 mfd.			
C48	Capacitor, fixed, disc ceramic	.01 mfd.			
C50	Capacitor, fixed, [illegible] type				
C51	Capacitor, fixed, disc ceramic	.01 mfd.			
C52	Capacitor, fixed, disc ceramic	.005 mfd.			
C53	Capacitor, fixed, disc ceramic	.005 mfd.			
C54	Capacitor, fixed, general purpose	220 mmf.			
C55	Capacitor, fixed, disc ceramic	.01 mfd.			
C60	Capacitor, fixed, silver mica	100 mmf.			
C61	Capacitor, fixed, disc ceramic	.01 mfd.			
C62	Capacitor, fixed, disc ceramic	.005 mfd.			
C70A	Capacitor, fixed, electrolytic	40 mfd.,		450 volts	
C70B	Capacitor, fixed, electrolytic	20 mfd.,		450 volts	
C70C	Capacitor, fixed, electrolytic	20 mfd.,		25 volts	
C71	Capacitor, fixed, metallized paper	.25 mfd.,		200 volts	
C72	Capacitor, fixed, paper	.005 mfd.,		400 volts	
C73	Capacitor, fixed, disc ceramic	.01 mfd.			
C74	Capacitor, fixed, silver mica	75 mmf.			
C75	Capacitor, fixed, silver mica	.002 mfd.			
C76	Capacitor, fixed, silver mica	.001 mfd.			
C80	Capacitor, fixed, disc ceramic	.005 mfd.,		[illegible] KV	
R10	Resistor, fixed, composition	100K ohms	1/2 watt	10%	
R11	Resistor, fixed, composition	47K ohms	1/2 watt	10%	
R12	Resistor, fixed, composition	47K ohms	1/2 watt	10%	
R13	Resistor, fixed, composition	68 ohms	1/2 watt	10%	
R14	Resistor, fixed, composition	68 ohms	1/2 watt	10%	
R15	Resistor, fixed, composition	150 ohms	1 watt	10%	
R16	Resistor, fixed, composition	4.7K ohms	1 watt	10%	
R18	Resistor, fixed, composition	150 ohms	1 watt	10%	
R21	Resistor, fixed, composition	100K ohms	1/2 watt	10%	
R22	Resistor, fixed, composition	100K ohms	1/2 watt	10%	
R28	Resistor, fixed, composition	47K ohms	1 watt	10%	
R31	Resistor, fixed, wirewound	20 ohms	5 watt	10%	
R40	Resistor, adjustable, potentiometer	1K ohms, linear taper			[illegible]
R41	Resistor, fixed, composition	47K ohms	2 watt	10%	
R42	Resistor, fixed, composition	100K ohms	1/2 watt	10%	
R43	Resistor, fixed, composition	100K ohms	1/2 watt	10%	
R44	Resistor, fixed, composition	100K ohms	1 watt	10%	
R45	Resistor, fixed, composition	2.2K ohms	1/2 watt	10%	
R46	Resistor, fixed, composition	150K ohms	1/2 watt	10%	
R47	Resistor, fixed, composition	470 ohms	1/2 watt	10%	
R50	Resistor, fixed, composition	47K ohms	1/2 watt	10%	
R51	Resistor, fixed, composition	100K ohms	1/2 watt	10%	
R52	Resistor, fixed, composition	1K ohms	1/2 watt	10%	
R53	Resistor, fixed, composition	1M ohms	1/2 watt	10%	
R61	Resistor, fixed, composition	220K ohms	1/2 watt	10%	

SYMBOL	DESCRIPTION	PART NO.
R62	Resistor, fixed, composition 220K ohms 1/2 watt 10%	
R63	Resistor, fixed, composition 1.2M ohms 1/2 watt 10%	
R64	Resistor, fixed, composition [illegible] ohms 1/2 watt 10%	
R65	Resistor, fixed, composition [illegible] ohms 1/2 watt 10%	
R66	Resistor, fixed, composition 100K ohms 1 watt 10%	
R67	Resistor, fixed, composition 1M ohms 1/2 watt 10%	
R68	Resistor, fixed, composition 1M ohms 1/2 watt 10%	
R69	Resistor, fixed, wirewound 5 ohms 1 watt 10%	
R70	Resistor, adjustable, potentiometer 100K ohms audio taper	[illegible]
R71	Resistor, fixed, composition 2.2K ohms 1 watt 10%	
R72	Resistor, fixed, composition [illegible] ohms 1/2 watt 10%	
R73	Resistor, fixed, composition 470K ohms 1/2 watt 10%	
R74	Resistor, fixed, composition 100K ohms 1/2 watt 10%	
R75	Resistor, fixed, composition 100K ohms 1/2 watt 10%	
R76	Resistor, adjustable, potentiometer 50K ohms, linear taper	[illegible]
R80	Resistor, fixed, composition 470K ohms 1/2 watt 10%	
R81	Resistor, fixed, composition 390 ohms 1 watt 10%	
R82	Resistor, fixed, composition 6.8 ohms 1 watt 10%	
SW1A to G	Complete Bandswitch Assembly	[illegible]
SW69	S.P.D.T. Slide Switch (ANL)	
SW70	S.P.D.T. Slide Switch (AM, CW, SSB)	
SW80	Power ON-OFF Switch on A.F. Gain Control R70	
X40	[illegible] Kc. Crystal	
TA-1	20 and 6 Meter Antenna Coil	[illegible]
TA-2	40 and 15 Meter Antenna Coil	[illegible]
TA-3	80 and 10 Meter Antenna Coil	[illegible]
TA-4	Broadcast Antenna Coil	[illegible]
TC-1	20 and 6 Meter Converter Coil	[illegible]
TC-2	40 and 15 Meter Converter Coil	[illegible]
TC-3	80 and 10 Meter Converter Coil	[illegible]
TC-4	Broadcast Converter Coil	[illegible]
TO-1	20 and 6 Meter Oscillator Coil	[illegible]
TO-2	40 and 15 Meter Oscillator Coil	[illegible]
TO-3	80 and 10 Meter Oscillator Coil	[illegible]
TO-4	Broadcast Oscillator Coil	[illegible]
T2	[illegible] Kc. I.F. Transformer	[illegible]
T3	262 Kc. Inter-stage I.F. Transformer	[illegible]
T4	262 Kc. Inter-stage I.F. Transformer	[illegible]
T5	262 Kc. Output I.F. Transformer	[illegible]
T6	262 Kc. Beat Frequency Oscillator Coil	[illegible]
T7	Audio Output Transformer	[illegible]
HJ-1	Headphone Jack	
PL-1	Pilot Lamp #47	
PL-2	Pilot Lamp #47	
PC-1	Power Connector, Chassis Mtg. (Male)	[illegible]
	Power Connector, Female	[illegible]
AJ-1	Antenna Jack (Female)	[illegible]
	Antenna Plug (Male) Not Furnished	[illegible]
Front Panel	Silk Screened Front Panel	[illegible]
Cabinet	Complete Enclosure Less Front Panel	[illegible]
Dial Scale	Silk Screened Dial Scale	[illegible]
Pointer	Dial Pointer	[illegible]
Dial Cover	Transparent Plastic Dial Cover	[illegible]
Knob	Knob with Chrome Insert	[illegible]
Knob	Knob with Chrome Insert and Guide Line	[illegible]
	(KBS-1) Accessory "S" Meter	
M1	0-1 Ma. D.C. 2" Square Meter	
R1	Resistor, Adjustable, Potentiometer [illegible] ohms, Linear Taper	
R2	Resistor, fixed, composition [illegible] ohms 1 watt 10%	
R3	Resistor, fixed, composition [illegible] ohms 1 watt 10%	

PMR-8 VOLTAGE AND RESISTANCE CHARTS

PMR-8 RECEIVER VOLTAGE CHART

Pin #	1	2	3	4	5	6	7	8	9
V1 [illegible]	0	-0.75	6.3	0	250	225	0		
V2 [illegible]	-2	.25	6.3	0	150	28	0		
V3 [illegible]	145	NC	5.4	0	152	-6	0		
V4 [illegible]	-8	0	0	6.3	250	60	0		
V5 [illegible]	0	0	0	6.3	250	26	2.2		
V6 [illegible]	0	0	0	6.3	13.6	0	13	.2	0
V7 [illegible]	0	-.5	-.5	12.6	6.3	1.2	0	5	50
V8 [illegible]	0	15	12.6	6.3	250	250	NC		
V9 [illegible]	NC	12.6	12.6	NC	NC	6.3	5.4	5.4	300

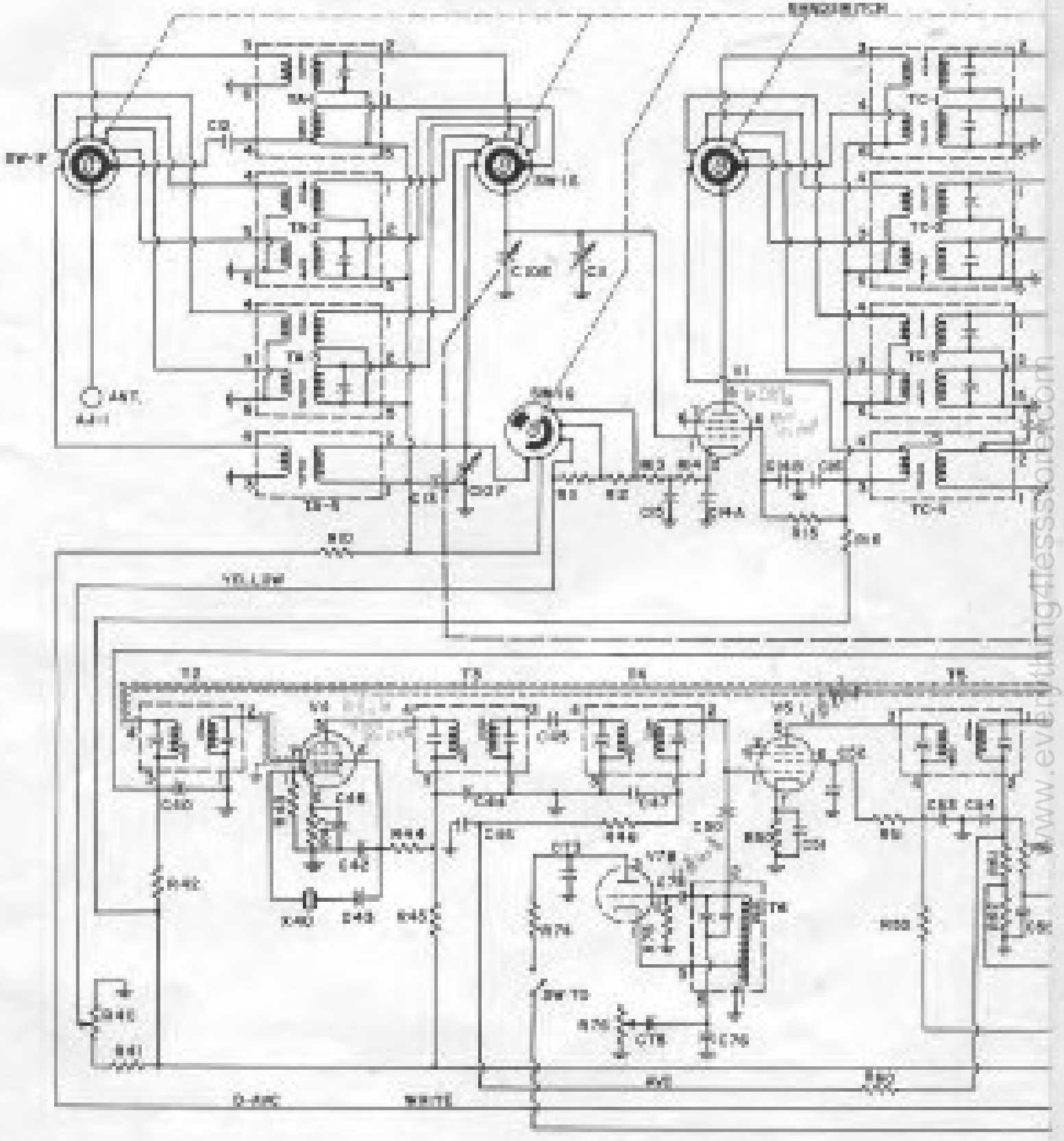
All voltage and resistance measurements made with respect to chassis using a Simpson model 260 multimeter, 20,000 ohms per volt.

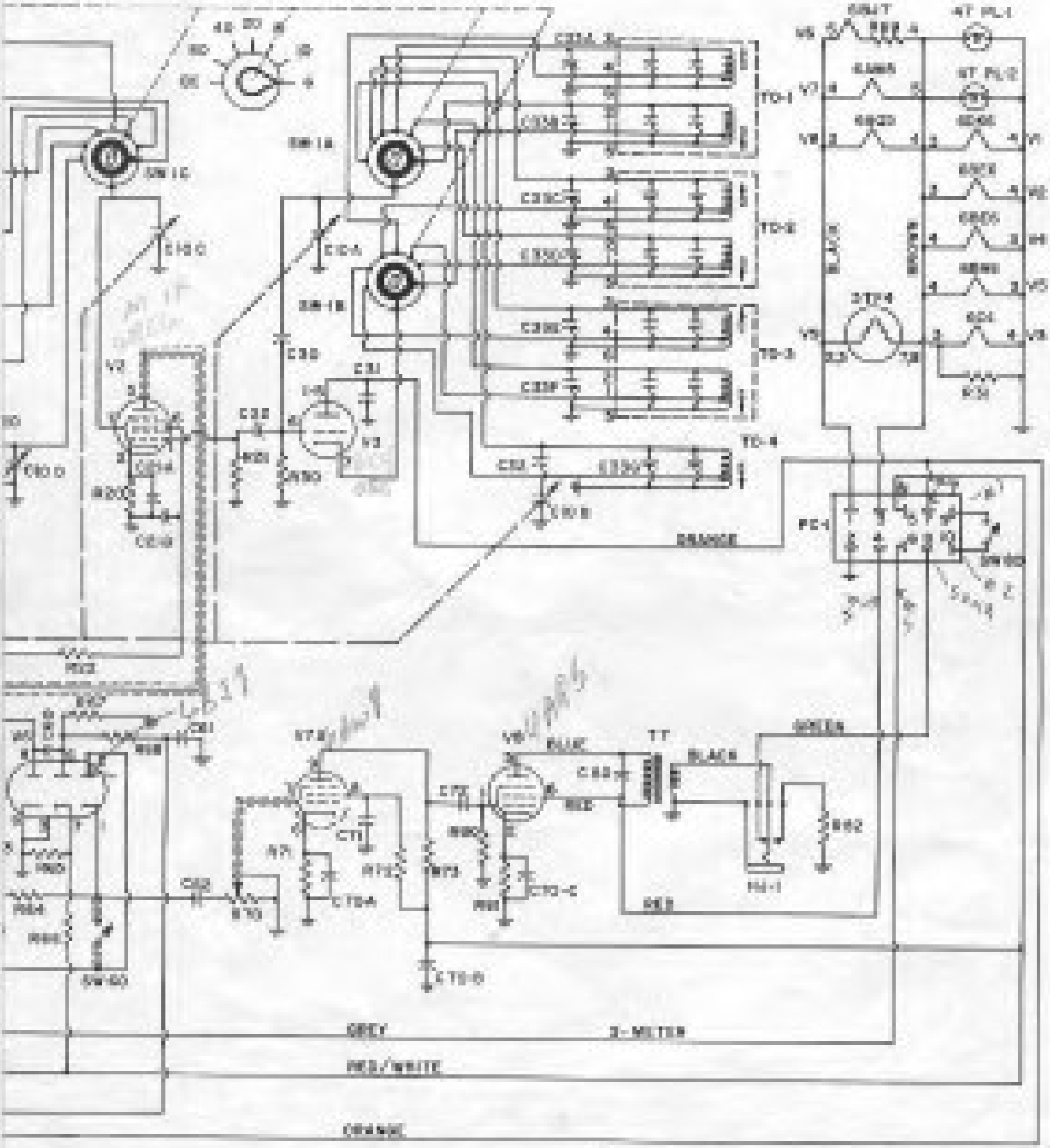
All voltage measurements taken with a model [illegible] power supply, filaments connected for 12 volt operation, A.F. gain set at minimum, R.F. gain at maximum, A.N.L. in OFF position, B.F.O. in AM position and with the antenna shorted to ground.

PMR-8 RECEIVER RESISTANCE CHART

Pin #	1	2	3	4	5	6	7	8	9
V1 [illegible]	22.6K	2.2K	.6	0	18K	80K	0		
V2 [illegible]	100K	100	.6	0	220K	280K	2.2		
V3 [illegible]	INF	NC	.6	0	INF	50K	.6		
V4 [illegible]	100K	0	0	.6	18K	100K	2.2		
V5 [illegible]	2.75M	0	0	.6	INF	INF	470		
V6 [illegible]	220K	220K	0	.6	1	1.1M	2.5K	220K	0
V7 [illegible]	0.5	100K	INF	1	.6	2.2K	100K	3,000	100K
V8 [illegible]	470K	200	1	.6	INF	INF	NC		
V9 [illegible]	NC	1	1	NC	NC	.6	0	1	NC

All resistance measurements taken with the power plug disconnected, filaments connected for 12 volt operation, A.F. gain set at minimum, R.F. gain at maximum, A.N.L. in OFF position, B.F.O. in AM position and with the antenna shorted to ground.





SCHEMATIC